Creativity, Innovation and Entrepreneurship: its interrelations and impact on economic growth and development in the knowledge society.

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PROBLEM STATEMENT AND OBJECTIVE

It is notorious that we live in the knowledge society. The deep technological changes that have taken place in the last decades have produced a qualitative change in the economic structure of the industrialized countries. In the economic scene we witness both a globalization and a localization or regionalization of the economy. In sectors that base its competitive advantage on mobile capital with immobile lower-cost labour globalization leads to delocalization of production from high wages countries to countries with low-cost labour. However, when the competitive advantage is based on knowledge as is the case in the knowledge economy, geographic proximity and the territory become a decisive factor in the economic activity because knowledge tends to be developed in the contexts of localized production networks embedded in innovative clusters.

In Western countries the traditional industrial economy, which has been called "*managed economy"* (Audretsch and Thurik, 2001) because it is governed by the *technostructure* (Galbraith,1967) is being transformed in an "*entrepreneurial economy"* in which the decisive factor in the economy and the competitive advantage is innovation and new technology companies in a reduced geographic area. It thus emerges *localization or regionalizatin* as a cross-current to *globalization.* The territory thus becomes a central concept.

Innovation, creativity, and new firm formation are closely interrelated. Technical progress leads to innovation waves and these lead to creation of new firms and they, in turn, generally suppose an innovation. Creativity stands in the doorway of both phenomena although it is usually not explicitly associated with them. These three phenomena are symbiotic and constitute the bases of economic growth and development.

The purpose of this paper is to analyse the interrelation between creativity, innovation and entrepreneurship in the knowledge society and its impact on economic growth and development. Thereby we will highlight the sub-factors that underline these three phenomena and draw on the available empirical evidence to explain them. In our analysis we will focus on the regional, institutional, and social context.

INNOVATION AS A KEY FACTOR OF ECONOMIC GRWOTH AND DEVELOPMENT

The importance of innovation as a key factor of economic growth and development is not new. It was highlighted by such prominent economics like Smith, Schumpeter, and Arrow to mention only three of them. For instance, Adam Smith (1776) already mentioned in the first chapter of his book The Wealth

of Nations the relationship between scientific progress and technical progress in industry. Joseph Schumpeter in his Theory of Economic Development (1912) considered the entrepreneur's task and capacity to realize new combinations of the production factors, i.e. innovation, as the basis of his theory. And Arrow (1962) pointed to the relationship between economic welfare and the resources assigned to innovation.

On the other hand, Jewkes and his colleagues (1958) concluded that in the XIX century the relationship between science and invention was much closer than generally believed.

Therefore, it has always been assumed the existence of a positive relationship between scientific progress, invention-innovation and economic development. Anyhow, it has only been in the last decades where the need of the scientific progress and innovation has been considered vital to meet the challenge of the competitiveness of nations and firms at a global level. We therefore think that it is necessary to refer briefly to two important aspects in this context: the analysis of the existing differences among the different countries regarding the R+D expenditure and innovation and to the empirical studies to understand the complex innovation phenomenon both at the country and firm level as well as its conditioning factors.

R+D expenditure and innovation

Since Solow (1956) based his model of economic growth on the neoclassical production function with its key factors of production, capital and labour, this model has served as a basis for explaining the determinants of economic growth. Romer (1986) and Lucas (1988) criticized Solow's model arguing that in his model an important factor of production was missing, i.e. knowledge. They argued that knowledge was an important factor of production, along with the traditional factor of labour and capital, because it was endogenously determined as a result of externalities and spillovers.

The first empirical studies on innovation have taken as a point of departure the investment in R&D by industry or at the country level as a percentage of the GDP and as output the number of patents. These studies hypothesize a positive relationship between investment in R&D and economic growth. For instance, Lichtenberg (1992) and Eaton & Kortum (1993) found that the level of R&D expenditure and the number of scientists and engineers were significant factors for explaining the income level of a country. Recently it has been reported that an investment of 32 mill. euros supplied by the Dublin Government in the period 2001-2005 to the biotechnology sector has generated an increase of 125 mill. euros in Irland?s GNP in these five years. Similar results are reported on Scotland (La Vanguardia, 26.04.07).

The relationship between R&D expenditure and productivity has been studied by several researchers. For instance, Coe & Helpman (1993) show that the national and foreign "stock of knowledge capital" - i.e. the accumulated R&D expenditure in a country and in the countries with which there are exchange relationships – help to explain the productivity growth in the OECD countries.

The increased availability of micro-level data in the EU in recent years, especially with the Community Innovation Survey (CIS) since 1990, has led to an increasing number of studies on the links between R&D, innovation and productivity at the company level.

Anyhow, Griliches (1979) has raised two questions regarding such studies, i.e. regarding the measures of the "output" in R&D intensive industries, and on the definition and measure of the "stock of R&D capital". Another critique has come from Pack (1994) who argues that R&D is not the only fac-

tor that explains variations of the GDP across countries. It has been found that slower growth of physical and human capital are minor sources of the slower growth rate of aggregate output. Similarly, the slowing in R&D, if any, has had a minor effect (Griliches, 1988). Moreover, the data suggest that changes in the ratio of R&D to GDP have not been large and that countries such as Japan whose R&D continued to grow rapidly were subject to the same slowing in total factor productivity growth. "In sum – writes Pak (1994-59) – the direct support for endogenous growth theory in explaining recent performance in the OECD countries is weak".

Anyhow, apart from the direct relationship between R&D expenditure and GDP or R&D and total productivity, it is worth remembering that the investment in R&D is also important for two additional reasons: on the one hand, the nature and magnitude of the "spillover effect" of R&D (Griliches, 1995 and Geroski, 1995). We will revert into this matter in the next section. The other has to do with the relationship between R&D and generation of opportunities. It is well known that technological opportunities are generated through investments in knowledge production. The new knowledge not only contributes to create new technological opportunities but the spillover effect spreads to third persons (Azuolary & Shane, 2001; Archibald et al. 2002; Acs et al. 2005).

In sum, without underestimating the importance of R&D expenditure for economic growth, the above studies highlight the fact that although R&D plays an important role, it is not the only factor that explains innovation and economic growth, as we will see later.

Territory and innovation. The spillover effect

A key concept in the theory of endogenous regional development is the *spillover effect*. This theory claims that the endogenous development is based on firm behaviour, i.e. on the investment in R+D, on the organizational learning, and on the quality of its human resources (human capital). The *spillover effect* refers to the diffusion effect of knowledge and experience that each investment produces. This effect that is external to the firm fosters the creativity and improves the productivity of the firms in a specific territory, thus permitting endogenous growth and development.

Anyhow, the first endogenous growth models (Romer, 1986; Lucas, 1988, and Rebelo, 1991 among others) did not explain the process by which knowledge spills over from the firm producing it for use by a third-party firm and treated the process as exogenous. This was to some extent remedied by the neo-Schumpeterian models of endogenous growth (Schmitz, 1989, Segestrom et al., 1990; Segestrom, 1991; Aghion and Howitt, 1998). These neo-Schumpeterian models design entrepreneurship as an R&D race where a fraction of R&D will turn into successful innovations. But these models do not specify either the characteristics of a certain area or territorial unit that are relevant to produce the exchange of knowledge among the firms (Vazquez Barquero, 2002).

Research in the last decades has made evident that the learning processes, the diffusion of knowledge and therefore its spillover effect are produced and/or facilitated basically by the following factors: a) social networks, b) social mobility and c) entrepreneurial capital.

Social networks. Social networks exist at multiple levels of analysis because ties can be established among individuals, groups of individuals, firms, industries, between universities and firms, and in geographic areas. They have been called *"social capital"*. Networks can link members of one category with members of another. For instance, Powell, Koput and Smith-Doerr (1996), Florida & Cohen (1999), and Feldman et al. (2002) have shown how the universities facilitate the pillover of knowledge

through recruiting and attracting talent to the territory, transmitting technology through local networks, training graduates for the firms and supplying a platform for the companies, individuals and public agencies to interact.

In a similar way, Florida and Kenney (1988) analyzed the relationships that venture capital firms had with talent and human resources that they then transferred to their clients that generally are technology new firms. Gompers and Lerner (1999) have shown how the geography affects the localization of venture capital firms.These authors show that the geographic distribution of venture capital firms is spatially biased towards those regions in which predominate the concentration of technology new firms, like California, New England, and New York. Furthermore, Sorenson & Stuart (2001) found that the localization of new firms is important to obtain venture capital. In their analysis of the factors that determine venture capital investments in the 1986-1988 in the U.S. they found that the probability that a venture capital firm invests in a firm diminishes as the geographic distance between the venture capital firm and the potential new client increases.

Social mobility. Social mobility within the same industry or territory is another important factor to foster the exchange of information, knowledge and experiences in it, thus strengthening the *spillover effect.* Hence the way Saxenian (1990) explains the situation referring to the Silicon Valey:

"It is not simply the concentration of skilled labor, suppliers and information that distinguish the region. A variety of regional institutions –including Stanford University, several trade associations and local business organizations, and a myriad of specialized consulting, market research, public relations and venture capital firms- provide technical, financial, and networking services which the region's enterprises often cannot afford individually. These networks defy sectoral barriers: individuals move easily from semiconductor to disk drive firms or from computer to network makers. They move from established firms to start-ups (or vice versa) and even to market research or consulting firms, and from consulting firms back into start-ups. And they continue to meet at trade shows, industry conferences, and the scores of seminars, talks and social activities organized by local business organizations and trade associations. In these forums, relationships are easily formed and maintained, technical and market information is exchanged, business contacts are established, and new enterprises are conceived… This decentralized and fluid environment also promotes the diffusion of intangible technological capabilities and understandings".

Malecki (1997) was one the first authors to point out the importance of qualified labour force as a mechanism for the transference of knowledge in technology based industrial clusters. Provenzer (1997) and Zucker et al. (1998) show that biotechnology firms tend to be located in few geographic areas and that is due to the fact that in them the most outstanding scientific of this field can be found. This finding is corroborated by Audretsch and Stephan (1996).

Entrepreneurship capital. This is another mechanism that will be treated in the next section.

Business strategy and innovation

The fact that the U.S. experienced lower growth after 1997, specially compared to Japan, triggered a number of studies of the factors that does not contemplate the theory of regional endogenous development.

We are referring to the strategy of a firm in general terms. Under this term we include the management and organization systems, i.e. the capacity and creativity to conceive, design and implement

not only new business strategies but new management systems like "just in time", quality circles, total quality management, etc. (Dertouzos, Lester & Solow, 1989). This was evident in Japan but also later in Europe.

The low cost airlines and IKEA are good examples. In these airlines the success does not result from the investment in R&D but on the creativity and innovation, that is, the strategic conception of the business that supposes a new combination of production factors and a new means-ends relationship. The objective –end- of the company are the same as their competitors- to transport passengers - , but the means are different (Veciana, 2005). IKEA has innovated the marketing and organizational system combining sales by catalogue and sales in the shop based on an innovative product and production strategy.

The management systems also include the human resources policy, specially the recruiting, training and motivation of the employees that is considered nowadays as the most important factor in the resource based view of the firm. As an example we would like to mention the NESTLE's "program innova" in Spain to foster creativity and innovation. This program was started in 1996 with the objective to double the impact on sales from innovation of new products and focused on the environment, the creativity and the processes. This program included the organization of creativity seminars that were attended by 190 employees and managers from the departments of marketing, sales, technical division, R&D, etc. As a result of this program 5.135 ideas were received coming from all areas of the firm (2.042 from the headquarters, 2.560 from the factories, 126 from the pensioners, 407 from regional sales divisions). The percentage of sales resulting from new products rose from 5% in 1996 to 11% in 2006.

Therefore, besides the spillover effect, the conviction emerges that one of the factors that determine the long term productivity and competitiveness is the organization itself, that is, the organizational factors as already pointed out by Stiglitz (1988) and Pack (1994). "Indeed – Pack writes (1994:60) - the earliest growth models, which viewed μ (1) reflecting disembodied sources of productivity growth, conform more to the sprit of the new focus on organization than models emphasizing externalities". Changes in organisations and institutions do not stem from R&D, at least as usually conceptualized and measured. Differences in organisation probable help to explain how a sustained difference in income levels can occur between two countries, even if capital (measured in whatever augmented fashion) is identical.

Therefore, from the above mentioned evidence the conclusion can be drawn that the innovation that leads to competitiveness and economic development exists also at the firm level and does not exclusively come from investment in R&D but also from the creativity and from the ability and competencies of the firm management.

Firm size and innovation

Although statistics show that large companies invest more than the small and medium size firms in R&D, several studies on this topic have shown that SMEs contribute to innovation as much as large firms.

The usual practice to measure the output of R&D expenditure through a simple patent count has been questioned by several researches for two reasons. First, because a simple patent count does not include the quality of the "innovative output" (Hall et al., 2005). Second, because patents do not fully

reflect the result of the innovative effort of firms. Many innovations are not patentable. For SMEs the process to patent an innovation is slow, expensive and deterrent, and what is still more important, in the knowledge society not only the patentable innovations count but also innovations in strategy and management systems are important, as we have seen above.

In a study by *The Futures Group* (1984) for the U.S. Small Business Administration that replicated an earlier study by Gellman (1976) analysed a database consisting of 8.074 product innovations in the U.S during 1982 and found that small enterprises innovated at a higher rate than large firms, the rate being 1,24 to 2,38 times the ones of the large firms. Audretsch (1991, 1995) concludes that small enterprises are not necessarily in a disadvantage versus the big corporations and adds that the ability to innovate allows small firms to compensate the disadvantages of scale compared to big companies.

Audretsch and Acs (2006) found no empirical evidence showing the existence of increasing innovative outputs as the firm size grows. On the contrary, the factor that had a positive influence was "skilled labour force" (2006:29). Chakrabarti (1991) found that small firms produced more innovations per dollar invested in R&D than the large ones.

ENTREPRENEURSHIP AND INNOVATION

In this section we will examine why and how new firm formation has become an important mechanism for innovation and hence for economic growth, development, and competitiveness. To support our argument we will analyse the four main factors that impact the rate of new firm formation: a) entrepreneurial capital, b) the university, c) the immigrants and d) the creativity.

Entrepreneuship capital and new firm formation

By entrepreneurship capital it is meant the capacity for economic agents to generate new firms (Audretsch & Keilbrach, 2004). It does not refer to physical capital but to what traditionally has been named "entrepreneurial spirit", that recently has been measured as the number of new firms created in a certain area and period.

Research based on the entrepreneurship capital concept has emerged from the fact that investment in R&D – one of the factors that traditionally has been considered as a factor of endogenous development – has not always led to economic growth.

Indeed, the research by Acs et al. (2005) has again corroborated that there is not a systematic relationship between investment in R&D and GDP growth, as mentioned above. Therefore the above mentioned endogenous growth models do not offer any explanation why in some countries – like Japan and Sweden – with R&D expenditure higher than in other countries – had a low growth rate in the last decades while others – Irland and Denmark – have experienced higher and persistent growth rates. The GEM data (Global Entrepreneurship Monitor) confirm this fact. Whereas Irland and Denmark have higher TEA (Irland:8,10% (2004), 9,83% (2005), 7,4% (2006), 8,2% (2007); Denmark: 5,88% (2004), 4,75% (2005), 5,3% (2006), 5,4% (2007) , TEA in Japan and Sweden is lower(2,76%-2,22%-3,4%-4,3%, and 4,12%-4,4%- 2,9%-4,2% respectively).

Both Schumpeter (1912) and later Chandler (1977, 1999) have pointed to the entrepreneurial function or the ability of firms to take advantage of the technical progress. Therefore, the explanation of

the above mentioned difference would be the entrepreneurial capacity and the function that it realizes in technology transfer (Michelacci, 203).

As Alan Greenspan, ex-president of the U.S. Federal Reserve expressed some years ago: "At present there is an important stock of technology available that is not being exploited commercially, which means that that at any moment there can be a significant increase of productivity (La Vanguardia, May 8, 2005).

Therefore, although the investment in R&D and the existence of a stock of scientific knowledge are, in general terms, important factors in the new economy, its existence in a given territory is no guarantee of economic growth despite the spillover effect. This seems to be insufficient when the problem is to convert certain type of scientific or technological knowledge in economic knowledge. It is the entrepreneur who through his alertness, ability, and risk taking propensity realizes this important task in the knowledge society through new firm formation.

Therefore, new firm formation is the most important mechanism by which scientific and technological knowledge is converted into economic knowledge that enables the production of new products and services as well as high value added jobs in the knowledge society.

Audretsch and Keilbach's research (2004) has shown that the most significant territorial factors that explain entrepreneurship capital and differences in endogenous development among 327 regions in Germany are: skilled labour force (knowledge workers); immigrants; labour force diversity; agglomerations; local attractiveness, and local diversity, the two first mentioned factors being the ones with more impact.

Bartik (1989) in his research on the variation of new firm formation rates among different states in U.S. found that the main factors that had a positive impact on new firm formation rates were: demand, public services, immigrants and level of education of the labour force.

Therefore, in the knowledge society the question is not to create new firms to reduce unemployment but to produce new technology firms capable of growing and creating high value added jobs.

University and new firm formation

Universities are nowadays considered as an important source of innovations in a country or territory and therefore play a key role in new firm formation Together with industry, universities are the sector that invests more in R&D. Universities have undergone a deep change. They are not only considered as an institution concentrated in basic research but it is expected from them that through the conversion of scientific and technological knowledge into innovations they contribute to the competitiveness and economic growth of the region.

This goal should not only be attained by establishing the necessary links for the technology transfer from the university to the economy, but especially through "spin-offs" creation. For this purpose universities are establishing scientific and technological parks as well as incubators to facilitate the creation of spin-offs.

"Spin-offs" are important because: a) they enhance local economic development; b) they are useful for commercializing university technologies; c) they help universities with their major missions of research and teaching; d) they are disproportionately high performing companies; and e) they generate more income for universities than licensing to established companies (Shane, 2004).

Spin-offs creation is conditioned by two factors: by the university's investment in R&D and by the university's culture.

Research by Kirchhoff et al. (2002) confirms that R&D expenditure by the universities has a statistically significant impact on the rate of new firm formation in general (and not only spin-offs). This impact is due to two factors. On the one hand, the university produces graduates, and research has found a strong relationship between social capital measured by the concentration of adult population with university degrees and the growth of urban areas and new firm formation. On the other, besides spin-offs, the R&D activities by universities produce the same phenomenom mentioned above, i.e. the "spillover effect" in the industry and clusters.

Kirchhoff's research has also shown that the impact of university R&D on new firm formation lasts during min. 5 years. It also confirms the research results by Birch, Haggerty & Parson (2000) regarding the impact on economic growth in metropolitan and rural areas, the most important determinant factors being in this order: universities, skilled labour, airports and environmental attractiveness.

Armington & Acs (2002) have shown that the rate of new firm formation is high in areas where the percentage of university graduates is higher than in those in which predominates the unskilled labour.

The university not only fosters new firm formation in general and specially "spin-offs but also attracts the localisation of new technology companies as Audretsch and Lehman (2005) have shown.

Besides investment in R&D the university culture also impacts the spin-offs activities of universities (Bauer, 2001). Bair & Hitchens (1998) found that one university had problems in promoting the creation of "spin-offs" because scientists thought that they were against the scientific work and could question the university reputation. Kenney & Goe (2004) found that the departments of the University of Berkely had produced less spin-offs than those of the Stanford University because its culture is less supportive to spin-offs. Louis et al. (1989) also found that the differences in organizational culture and attitudes were the most important factor to predict the participation of researchers from the experimental schools in their own spin-offs companies.

The existence of entrepreneurial role models in the university is another factor that favours the spin-offs creation. The presence of entrepreneurs among the faculty is crucial for the formation of spin-offs companies (Hsu & Bernstein, 1997; Bauer, 2001).

Immigrants and new firm formation

From the socioeconomic viewpoint immigrants have been considered as workers that supply unskilled and cheap labour force in industrialised economies. Anyhow, more recently attention has been drawn to immigrants from less developed countries as a source of talent and new firm founders.

Although Light in the seventies already published the results of the first research on immigrants as new firm founders in the U.S. under the title: Ethnic Enterprise in North America: Business and Welfare among Chinese, Japanese, and Blacks (Light, 1972), only in the last two decades this topic has reached most industrialised countries (See Kloosteran & Rath: Immigrant Entrepreneurs: Venturing Abroad in the Age of Globalization, 2003).

The first important conclusion that has brought about the empirical studies is that the new firm formation rate among the immigrant population is higher than in the general autochthonous population (Min, 1984; Saxenian, 1990, Audretsch & Keilbach, 2004; etc.). Anyhow, the more recent studies

focus on immigrants with university degrees and specially scientists, engineers, legal immigrants and not on un-skilled workers.

For instance, Saxenian, in her study titled "*Silicon Valey's New Immigrans Entrepreneurs"* (1999) referred to the development of the regional economy in the Silicon Valey and the role played by immigrants. One of the most interesting results was that the Chinese and Indian engineers were managing 24% of the technology firms created between 1980 and 1998. Saxenian concluded that the scientists and engineers who were born abroad were creating a good portion of the jobs and wealth in the Californian economy. Even those that had returned to their countries of origin to take advantage of the opportunities there had established links in the U.S. and stimulated technological innovation and economic development in California.

The importance of the contribution to new firm creation by the immigrant population has again been confirmed by a recent study by Vivek Wadhwa et al. (2007). According to this study some characteristics of the engineering and technology companies started in the U.S. from 1995 to 2005 are the following.

- In 25.3% of these companies, at least one key founder was foreign-born. States with above-average rate of immigrant-founded companies include California (39%), New Jersey (30%), and Massachusetts (29%).
- Immigrant-founded companies in California are concentrated in the Silicon Valey. Over half (52.4%) of Silicon Valey startups had one or more immigrants as key founder, compared with the California average of 38.8%.
- Nationwide, these immigrant-founded companies produced $52 billion in sales and employed 450.00 workers in 2005.
- Indians have founded more engineering and technology companies in the US in the past decade than immigrants from the U.K., China, Taiwan and Japan combined. Of all immigrant-founded companies, 26% have Indian founders.
- Almost 80% of immigrant-founded companies in the US were within just two industry fields: software and innovation/manufacturing-related services.
- A comparison with Saxenian's 1999 findings shows that the percentage of firms with Indian or Chinese founders had increased from 24% to 28%.
- Regarding patens the study estimates that the contribution of non-citizen immigrants to the international patent applications increased from 7.3% in 1998 to 24.2% in 2006.
- The largest group of immigrant non-citizen inventors were Chinese (Mainland- and Taiwan-born). Indians were second, followed by Canadians and British.
- Immigrant non-citizens filed more theoretical, computational and practical patens than mechanical, structural or traditional engineering patens.

This study concludes stating that it is clear that immigrants have become a significant driving force in the creation of new business and intellectual property in the U.S. and that their contributions have increased over the past decade.

This fact should not be ignored when dealing with the issue of creativity, innovation and entrepreneurship and the public policies to promote them.

CREATIVITY AND NEW FIRM FORMATION

Creativity stands at the beginning of any research, innovation or new firm formation process.

Popper (1962/1973) affirms that scientific discovery contains an "irrational element" or "a creative intuition". Einstein (1934) talks in a similar way about the "search for those universal laws …" and that there is not a logical way that guide these laws. They can only be grasped by intuition".

The strategic innovation resulting from the combination of new production factors or the increase of the sales volume coming from new products, as in the case of Nestle's Program Innova , as we have seen above, are the fruits of creativity.

In the same way, the foundation of a new firm is also a "creative act of highest order (Collins & Moore, 1964:36). As we have explained elsewhere (Veciana, 2005) the point of departure of a new firms is always an IDEA. To start a new business the entrepreneur must have conceived a business idea, the business model that will mould the goals, activities, and products or services of the new company. It must be based on the identification of an opportunity, which exploitation should produce product and services that satisfy a latent or manifest need in the market.

Creativity has traditionally been studied at the individual level and considered to be the result from certain personal characteristics or from member heterogeneity in teams at the corporate level (Veciana, 1999) In this context we are interested in creativity as a stimulating factor of regional development and as creativity resulting from the social context, a research line that was initiated by Pack et al. already in 1925 and has been continued by other researchers in the last decades (Jacobs, 1961; Thompson, 1965; Lucas, 1988; Desrochers, 2001). Park et al. already pointed to the role of cities in concentrating and stimulating human creativity. Jacobs explained how cities function as open systems to attract talented persons with different education and experience and thus stimulating their creative capacity. Thompson was the first author to point out that cities function as "incubators" of new ideas and innovation. Lucas formalized Jacob's ideas in a basic theory arguing that cities function as collectors of human capital thus generating new ideas and economic development. Desrochers argued that economic diversity is a key factor in city and regional growth, as creative people with varied backgrounds come together to generate new and novel combinations of existing technology and knowledge to create innovation and as a result, new firms.

Lee et al. (2002) show that creativity, diversity and human capital have a positive and significant relationship with regional innovation production measured by per capita patent production. And Florida & Gates (2001) found that diversity has a positive association with regional high- tech output and growth. Audretsch & Keilbach's study (2004) on the regional differences in new firm creation in Germany also found that diversity is an important factor, as we have seen above.

In the same way and more specifically regarding the social characteristics of a certain territory and new firm formation we find a new research line focusing on the relationship between creativity and new firm formation. Whereas previous research has focused on the relationship between human capital and new firm formation, this new research line tries to find out the factors that explain the concentration of human capital in a certain territory, creativity and its relation with new firm formation rate.

Lee, Florida and Acs' research (2004) confirms a positive and significant relationship between creativity, diversity, human capital and the rate of new firm formation in a certain territory. Among these three factors creativity is the one that is more strongly correlated with new firm formation rate.

While in this line of research human capital is defined and measured as a person's capability which reflects level of schooling, accumulated experience, etc. more recent research (Florida, 2002 & 2004; Florida et al.2007) operate with an alternative measure for human capital, based on occupation, specifically a set of occupations that make up the "creative class", including science, engineering, arts, culture, entertainment, and the knowledge-based professions of management, finance, law, healthcare and education. Florida et al.(2007) found that human capital and the creative class effect regional development through different channels. The creative class outperforms conventional educational attainment measures in accounting for regional labour productivity measured as wages. They also found that tolerance is significantly associated with human capital and the creative class as well as with wages and income. Earlier comparative studies showed that the creative class measure outperforms conventional human capital measures in accounting for regional development in Sweden (Mellander & Florida, 2006) and the Netherlands (Marlets & Van Woerken, 2004).

The new theory and empirical research in the field of economic geography confirm the importance of agglomeration and the social context in economic growth and development (Krugman, 1991, and Acs & Varga, 2004).

SUMMARY AND CONCLUSIONS

Let us summarize the main sub-factors that contribute to creativity, innovation and entrepreneurship.

Creativity

- Heterogeneous teams
- Diversity
- Tolerance
- Creative class (scientists, engineers, artist, etc.) in cities.
- Cities as "incubators" of new ideas and innovation.
- Human capital

Innovation

- R&D expenditure
- Territory: spillover effect.
- . Social netwrosk
- . Social mobility
- . Entrepreneurship capital
- Business strategy and management systems
- Firm size: SMEs

Entrepreneurship

- Entrepreneurship capital/new firm formation
- Universities
- Immigrants

We can conclude that the above factors are in our opinion the ingredients to sketch an institutional theory of economic growth and development, a task that due to space limitations cannot be performed here.

They can also serve as a guideline for policy makers to inspire and base their public policy decisions to foster entrepreneurship, innovation, and economic development in the knowledge society.

Notes

(1) Annual rate of productivity improvement.

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